BRIEFING PAPER

TELECOMMUNICATIONS AND LOCAL ECONOMIC DEVELOPMENT IN SCOTLAND: DETAILING THE ISSUES

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Introduction

The study upon which this article is based was concerned with the availability and business use of telecommunications infrastructure and services in a specific locality in Scotland's Central Region. The research was also designed to identify and evaluate sources of advice to business users and, in particular, to highlight significant gaps in awareness about telecommunications amongst both the advisory and business user communities. As such this paper takes forward in a detailed way the evidence and argument which we set out in a previous paper in ***Quarterly Economic Commentary*** [Taylor et al, 1993].

From both our own work and that of others it is becoming evident that business activity is increasingly telecommunications-intensive. The transmission of information within and between firms, conveyed by combinations of telephones, faxes and computer networks of various forms, is leading both to innovative business practices and to the generation of new ventures, including the opening up of new trading opportunities.

The ***impacts*** upon firms of this telecommunications-intensity derive essentially from the 'time compression' offered by the speed of modern information transmission, from the 'space compression' provided by its spread, and from the new internal and external organisational relationships which telecommunications-intensity promotes.

The ***values*** afforded to businesses by this telecommunications-intensity include increased economy and efficiency, as costly processes and structures are effectively by-passed; increased effectiveness and competitive advantages as, for example, growing customer sensitivities derive from new information flows; and a more innovative environment as new product and services, as well as new working practices, are facilitated and stimulated.

Thus in differing degrees, many businesses are becoming ***dependent*** upon telecommunications. To one business the combination of telephone and answering machine, perhaps combined with paging and messaging services, becomes the core of its business administration. To another, high volume information management over global computer networks is the *sine qua non* of international competitiveness. In some businesses it is telecommunications which is providing the very basis for trading - the firm's *raison d'être* is bound up in its ability to receive and transmit information reliably, accurately and speedily on modern telecommunications-intensive systems.

These *impacts*, *values*, and *dependencies* [Hammer and Mangurian, 1987] for business firms have analogues in places - *cities* and *towns* (both centres and suburbs), for *regions* (both peripheral and core), and for *rural* communities.

The quality of telecommunications provision in particular places cannot be assumed. British Telecommunication's (BT) modernisation, and other investment programmes, are being implemented on the basis of a highly targeted strategy emphasising commercial benefit to the company rather than the provision of universal services. Similarly BT's main network competitor, Mercury Communications Ltd (MCL), has continued to target high volume businesses and looks set to continue to do so as regulatory change brings about 'equal access' and an intensified competitive environment.

Detailing telecommunications issues

The choice of the ancient county of Clackmannanshire in Scotland's central belt for our study was based upon a number of key factors, including the area's 'significant' industrial base in

which a wide range of industrial sectors are represented; the area's relative economic distinctiveness from Scotland's main cities; the administrative identity of the area which now conforms to the boundaries of Clackmannan District Council; and the presence of local support for economic development.

The local economy

The largest firms of Clackmannan District are in the textiles, glass, beer, whisky and retailing sectors, the majority of which are branch plants of large national or multi-national companies. Thus, for example, Paton and Baldwin of Alloa is part of the Coats Viyella group; United Glass is a subsidiary of a U.S. parent company; United Malt and Grain Distillers at Menstrie is part of the Guinness empire; and Weir Pumps in Alloa is part of the Weir Group. Two important features of the Clackmannan economy derive from this branch-plant phenomenon. First, many major decisions about business development, including telecommunications issues, are being taken outside the District, and, secondly, the area is said to have a 'dependency culture' which has developed from these industrial circumstances.

In addition, and most recently, however, the SME sector in the District was showing signs of growing strength, with the building trade withstanding the recession, and thus reflecting the growing dormitory/commuter status of the area's main settlements.

The local telecommunications network infrastructure

British Telecom (BT) is the dominant supplier of services and largest investor in telecommunications infrastructure in Clackmannan District.

The other major supplier of voice and data services in the area is Mercury Communications Ltd (MCL). However, MCL services are provided only to specific sites as leased lines, though these are some of the largest telecommunications customers in the area. MCL has not developed its own network into this area.

The two cellular operators, Vodaphone and Cellnet, both have coverage in Clackmannan District and no evidence emerged from the research of 'blind spots' or 'holes' in the cellular operators coverage.

There was no evidence that any other telecommunications operators were preparing to invest in Clackmannan District and there is no cable franchise, unlike in other areas of Scotland such as Perth and its environs.

BT's network in the District is being modernised as part of the company's broader national modernisation programme. The local network in the District has been towards the tail end of this process, however, with, for example, the main switch in Alloa not being due for replacement until later this year. At the time of the research some of the other smaller switches in the area were not scheduled for renewal until 1995 and 1997 (see Figure 1).

Figure 1 shows the linking of the Hillfoots towns (Alva, Tillicoulty, Dollar) into both the Stirling exchange and that of Alloa. The upgrading of the local exchanges in the Hillfoots, such as has been done in Alva and Dollar, gives customers direct access to advanced services, via the System X switch in Stirling. The modernisation of the Hillfoots towns exchanges is not scheduled for completion until 1995, however.

This modernisation programme is replacing the local exchange with Remote Concentrator Units (RCU) which route traffic into Stirling where it is then switched. In this way the range and quality of services in the Hillfoots is now becoming dependent on services in Stirling rather than Alloa.

The Alloa exchange is a large Crossbar unit installed in the late 1970s. The story of the Alloa exchange illustrates both the changing investment logic within BT, as it has moved from public organisation to private business, as well as the earlier difficulties experienced by the Post Office Telecommunications Function in developing and sourcing digital exchanges. The old Strowger exchange in Alloa was close to the end of its useful life by the early 1970s. It had become increasingly expensive to maintain and its capacity was beginning to limit the development of the customer base in Alloa. In the mid-1970s the decision to replace the switch was postponed for several years in anticipation of a new generation of switches becoming widely available and centred around System X. These new switches failed to materialise in the time expected and the decision was taken to replace the Strowger exchange with an analogue TXK or cross-bar switch with an anticipated life cycle of at least 25 years That earlier decision has had important consequences. The Alloa exchange has not been replaced until this

year. As a result, Alloa customers have been relatively disadvantaged compared to customers in other areas. Even within the District some of the Hillfoots towns, because of their being linked to the Stirling switch, have been receiving services which have remained unavailable in Alloa.

The use of telecommunications in the district - survey evidence

What was immediately obvious from our survey data was the relatively low level uptake of telecoms services in the District, both new and well-established. For example, the uptake of Fax and Modems in the District is respectively 69% and 25% compared to 82% and 31% for Scotland as a whole.

Furthermore, we found that private circuits are being used in the District largely in those establishments which are externally owned, thus reinforcing the general impression of low uptake of telecommunications services in the Clackmannan economy as a whole.

The level of telecommunications expenditure by firms in Clackmannan District also reflects this relatively low use of telecommunication services. For example, in Scotland as a whole, almost 31% of firms had quarterly expenditure in excess of £2,500, whereas only 5% of firms achieve this level of expenditure in Clackmannan District. Moreover, each of those establishments in Clackmannan District with telecommunications expenditure over £2,500 per quarter employs more than 75 people, whereas for Scotland as a whole, amongst the equivalent group of firms 52% employ fewer than 75 people. This evidence begins to suggest lower telecommunications ***intensity*** in Clackmannan District compared to Scotland as a whole.

The survey also sought to identify the sources of telecommunications advice used by firms in Clackmannan District as well as their general awareness of telecommunications. For telecommunications advice firms in the Clackmannan District had almost total reliance upon the main telecommunications service provider, BT. No fewer than 95% of respondent firms said that BT was their main source of advice. The only other sources of advice identified were 'colleagues within the firm' and 'fellow professionals', but these were normally insignificant. These data for Clackmannan District demonstrate an even greater dependency upon BT for advice than for Scotland as a whole where 84% identified BT as their main source. As we suggested in our previous article in ***Quarterly Economic Commentary*** BT now competes in the UK telecommunications market and therefore its advice has to be treated as commercially rather than public service influenced. These data are given further support by our findings on the awareness of telecommunications issues amongst local businesses. Broadly our key finding here is that local firms were poorly informed, both in an absolute sense and when compared to firms generally in the wider Forth Valley area.

The use of telecommunications in the district - interviews with the local economic elite

A series of detailed interviews with selected individuals in key organisations was undertaken, the main purpose of which was to provide further insights on the pattern of telecommunications use in the District. The firms chosen for those detailed interviews were the largest firms, as measured by employment size.

As we have seen, the major telecommunications users of the District are all *branch plants* and thus decisions over the provision and use of telecommunications services, including at these branch plants, are taken outwith Clackmannan District. What was clear from the interviews was that the telecommunications infrastructures of these branch plants were part of larger corporate private networks. Thus these large Clackmannan firms have become less dependent upon the public switched network as they rely increasingly upon private infrastructures. These private networks are also changing the nature of telecommunications expenditure in Clackmannan District by effectively removing large volumes of activity from the local economy and subsuming them into the corporate account. Moreover, these private networks are becoming a powerful force for reshaping firms, including changing the existing geographical distribution of activities.

A good example of these changes is provided by one of the biggest firms in Alloa. This firm is located on three sites - Alloa, a site in northern England and another in central Scotland which is its Headquarters. Until quite recently each site was largely responsible for its own telecommunications activity, with telecommunications traffic in and out of each plant largely on the public network. Each plant was responsible for its own expenditure and had its own level of telecommunications expertise

and its own switchboard. In the case of the Alloa plant, local telecommunications expenditure was in the order of £120k.

A new private network has now been installed linking all three sites. The backbone of this network is a 'megastream' link between all three sites and three new switches, one at each site. This network has created a single 'telecommunications space' for the company and in so doing has brought about a number of changes.

- intra company, inter site direct dialling
- direct dialling inwards on all three sites (a new service for Alloa as it is normally unavailable via the local BT exchange)
- intelligent switches which route all unanswered calls to a single switchboard for the entire company, providing least cost routing
- dual sourcing of telecommunications services
- all long distance calls are routed out of the group at the lowest cost point, e.g. all calls to London routed via the internal network to the English plant and thence on to the London Public Switched Telephone Network (PSTN)
- centralisation of telecommunications expertise and expenditure at the company headquarters only.

For the Alloa plant the new network is bringing about a number of changes. Firstly, improved services are being provided for the company independently of the PSTN. Secondly, the new network is allowing for a reshaping of the administrative functions of the company. This has adversely affected Alloa, with the removal of over 60 jobs from the plant as the administrative functions are being concentrated at company HQ. There are, for example, no longer any telephone switchboard operators in the Alloa plant, these services being provided from HQ.

Shifts such as these can have a bearing upon BT's decisions about upgrades in the Alloa switch and transmission system. In effect, as telecommunications traffic is put on to private circuits so the 'exhaustion rate' of the local public infrastructure is pushed further back.

Amongst locally owned large firms evidence was found that telecommunications may provide new opportunities for business development. For example, one locally owned firm is concerned to reshape the relationship between consumption of its product in its retail outlets and their distribution and production. The existing relationships are relatively imprecise with changes in consumption not necessarily reflecting themselves in distribution and production activities thus leading to stock shortages and lost sales.

The industry in which the company trades is moving towards point of sale (POS) technology which automatically signals orders to distribution and thence to production allowing at the same time for the better management of cash and the ability to model information on business transactions. Such systems represent a reversal of the pre-existing process in that actual consumption drives the system, rather than production.

In this particular case the development of a POS system would actually increase the company's dependence on the public network for it would be hard to imagine the level of telecommunications traffic between each retail outlet and the HQ in Alloa justifying investment in a private network. The absence of digital telecommunications and services such as ISDN in Clackmannan District, as well as the uncertainty surrounding its development, is potentially a significant obstacle for this firm and others like it.

Trading patterns of firms in the Clackmannan district economy

A further dimension to the work reported in this article was an analysis of existing and planned trading patterns of firms in this local economy. This was done in order to discern general business communications issues within which telecommunications might play and important part.

This analysis began with an exploration of existing trading patterns, both with suppliers and buyers. On the supply site it was found that almost 50% of local firms deal with suppliers in the UK other than Scotland, and 10% work to suppliers in Europe.

On the buyer side there is a very strong customer base within Clackmannan District itself and in the rest of Scotland. There is also a strong customer presence within the rest of the UK (almost 40% of local firms thus trading). And almost 20% of firms within the area have a customer base within Europe.

Local companies were not only asked about their trading patterns over the past decade, but also about

their expectations for the following five years. One finding here was the apparently 'static' nature of the Clackmannan District economy over the last decade. One explanation for which is the strength inherent in well-established and stable trading links in some of its major sectors, such as glass and brewing.

Thus the 'static' nature of Clackmannan District economy is reflected in the relative stable use of communications media, for example some 62% of companies perceived no changes in the use of communications methods over the past ten years. Thus here is further evidence that the proliferation of new telecommunications services emerging in the 1980s appear to have passed by the Clackmannan economy. The adoption of fax and mobile 'phones were seen by many local firms as important developments, but beyond the adoption of these easily understood and easy to use technologies very little use in the way of advanced telecommunications was indicated.

The evidence on future trading intentions sits in contrast to the previous decade as no less than 41% of firms indicated that they had plans for change and/or expansion. When these plans are broken down by firm size it is revealed that 50% of large firms have such plans for change in their trading patterns, alongside 25% of medium firms and 41% of small firms. A more detailed analysis of these expansion plans revealed that 63% of large firms had plans for expanding into Europe, alongside 4% of medium sized firms and 15% of small firms.

In contrast to the anticipated and planned-for change in trading patterns, there was little evidence of change being perceived in the use of telecommunications services. The data in Figure 2 reveal a stability in perceived use of communications services, suggesting a major gap between trading intentions and the communications which might be needed to support these changes. Thus firms in Clackmannan District were not, by and large, anticipating changes in their use of telecommunications services. The present use of basic telephony and the 'simple' technologies of fax and mobile phones are seen as satisfactory. Only 10% of companies are envisaging an increasing use of modems. Overall it appears that most firms in Clackmannan District have yet to make the link between the use of telecommunications and their need for changed communications structured in support of their planned business development.

The key telecommunications issues in the Clackmannan economy

In this section the telecommunications issues for the Clackmannan economy which emanate from the preceding sections of this article are drawn out and synthesised. Telecommunications issues emerging from this work were identified as falling into two broad types. First there are issues which concern contemporary telecommunications policy and its manifestation in the specific case of Clackmannan District. Secondly, there are issues relating to the interrelationship between telecommunications and economic development.

BT is by far the dominant provider of telecommunications infrastructure and services in the Clackmannan economy. BT's UK-wide modernisation programme has increasingly come to place emphasis upon the imperatives of securing and increasing income streams and upon driving out costs. These imperatives have tended to lead to an investment hierarchy which places areas such as Clackmannan District relatively lowly. The findings from this work support this analysis of BT's modernisation programme. The main switch in the District, in Alloa, is a Crossbar which has not ben scheduled for upgrade until this year at the earliest, and some of the smaller switches in Clackmannan District will not be upgraded until the mid- 1990s. Fewer than 16% of exchange connections in the UK are still served by Crossbar or Strowger exchanges, yet Alloa, the District's central place, is one such case in point.

MCL's role in Clackmannan District is low key. The company is active in providing telecommunications to some of the largest companies in the area, but it has no intention of becoming a major competitor to BT in places such as this before and until the advent of 'equal access' and the general extension of its network. Where MCL has a presence in Clackmannan it is through its business with companies whose telecommunications infrastructures are decided upon and requisitioned outwith this local economy.

The relatively unmodernised state of BT's network and the low-key presence of MCL have two main policy consequences for the local economy. The first of these is that many modern and enhanced telecommunications services which require digital infrastructure for their transmission were not available in the District at the time of this research. Services such as ISDN were unavailable to much of the area and will remain so for the majority of

businesses in the District until the upgrade of the Alloa switch in 1993. The second main policy consequence of these telecommunications infrastructures lies in the absence of effective competition in telecommunications provision. Competition should help to reduce firms' costs and to improve service quality. Competition might also be expected to lead to greater levels of awareness of telecommunications services and issues.

Decisions about upgrading the telecommunications infrastructure in places such as Clackmannan remain, in part, a function of the rate of exhaustion of local switching capacity. A major finding from our work was that as some of the District's largest businesses begin to restructure and rationalise their telecommunications provision through more extensive use of private circuits, so this has the twin effect of reducing costs and raising service quality for the individual firm concerned whilst simultaneously reducing demands made on the local public switched network. This latter in turn acts so as to reduce the 'exhaustion rate' of the local switches which itself may then lead to a rescheduling forwards of the upgrade programme.

The telecommunications issues outlined above not only directly map on to the contemporary telecommunications policy debate, they also raise important questions for the development of a local economy. Of particular importance is the inter-relationship between the trading patterns of firms and their use of telecommunications services to support the linkages with suppliers and customers. Trading links between firms are becoming increasingly information-intensive suggesting the urgent need for the adoption and use of advanced telecommunications services. In an increasingly competitive and global economy relatively low rates of adoption of new telecommunications services can be seen as inhibiting the development of firms.

What is evident from our study of firms in the Clackmannan economy was an historic equilibrium between trading patterns and telecommunications use which is now increasingly subject to challenge and change. The well-established and virtually static trading patterns exhibited during the 1980s allowed firms in the District to ossify in their use of telecommunications services. As a result, the current use of telecommunications services fails to reflect the diversity and range of services that have increasingly become available. This pattern of use is characterised by a reliance upon telephony, and, to a lesser extent, fax. The exceptions to this tend to be the larger plants, the branch plants, where the key telecommunications decisions are made outwith the Clackmannan District.

This historic stability is being challenged by an anticipated shift in the trading patterns of local firms. Whereas past performance has emphasised stability, future intentions are focusing more upon expansion. However, this change and expansion is not being put alongside anticipated changes in the use of telecommunications services. The resulting gap is of significance as the initiation, development, management and maintenance of an increasingly complex and geographically dispersed linkage structure suggests the importance of the adoption and use of telecommunications services.

This gap between plans for expansion in trading patterns and negligence of telecommunications use raises the important issue of advice available to firms. What our research clearly demonstrates is the almost total reliance upon BT in this respect and the absence of independent sources of advice. What was also evident in the case of Clackmannan District was the very low awareness of telecommunications by key agencies concerned with economic development. The major agencies providing advice to local firms were largely unaware of the opportunities which telecommunications services can offer for the forging and reshaping of new and existing trading links.

The almost exclusive reliance upon BT for telecommunications advice raises questions both over its impartiality and over the extent to which BT is prepared to offer advice at all. Thus BT has a classic marketing dilemma consequent upon the company's uneven roll out of new infrastructures and services. In the case of Clackmannan District this was particularly so for ISDN which was then becoming available in nearby Stirling but which could not be acquired in Clackmannan District.

Conclusion

This paper has provided evidence of an incipient trend amongst local business firms in this District of Scotland towards the expansion of trading activities, often into Europe. This local economy may well be at a point of watershed, seeking to move on from its relatively static qualities of recent years. Yet it is not clear that the telecommunications infrastructure is of sufficient quality to support planned expansion. Nor is it clear that firms or, indeed, local business advisers, are sufficiently aware of modern

telecommunications to proffer good and sound advice.

Those agencies which have responsibility for economic development must be updated on the range and contemporary significance of telecommunications infrastructures and services. 'Advice packages' aimed at businesses should provide illustrations of the business benefits to be gained from telecommunications services.

The evidence from previous work is that a competitive presence in telecommunications provision stimulates levels of business awareness of the significance of telecommunications. It is imperative that local agencies actively seek the involvement of other licensed operators, most obviously MCL, in developing local telecommunications supply and consumption.

It is equally important that economic development agencies and BT are clear about the quality of their local public switched network. Where necessary BT should be pressed to upgrade local infrastructures and business developers should be clear that BT's modernisation programmes for their area will convey **ALL** new and enhanced telecommunications services.

References

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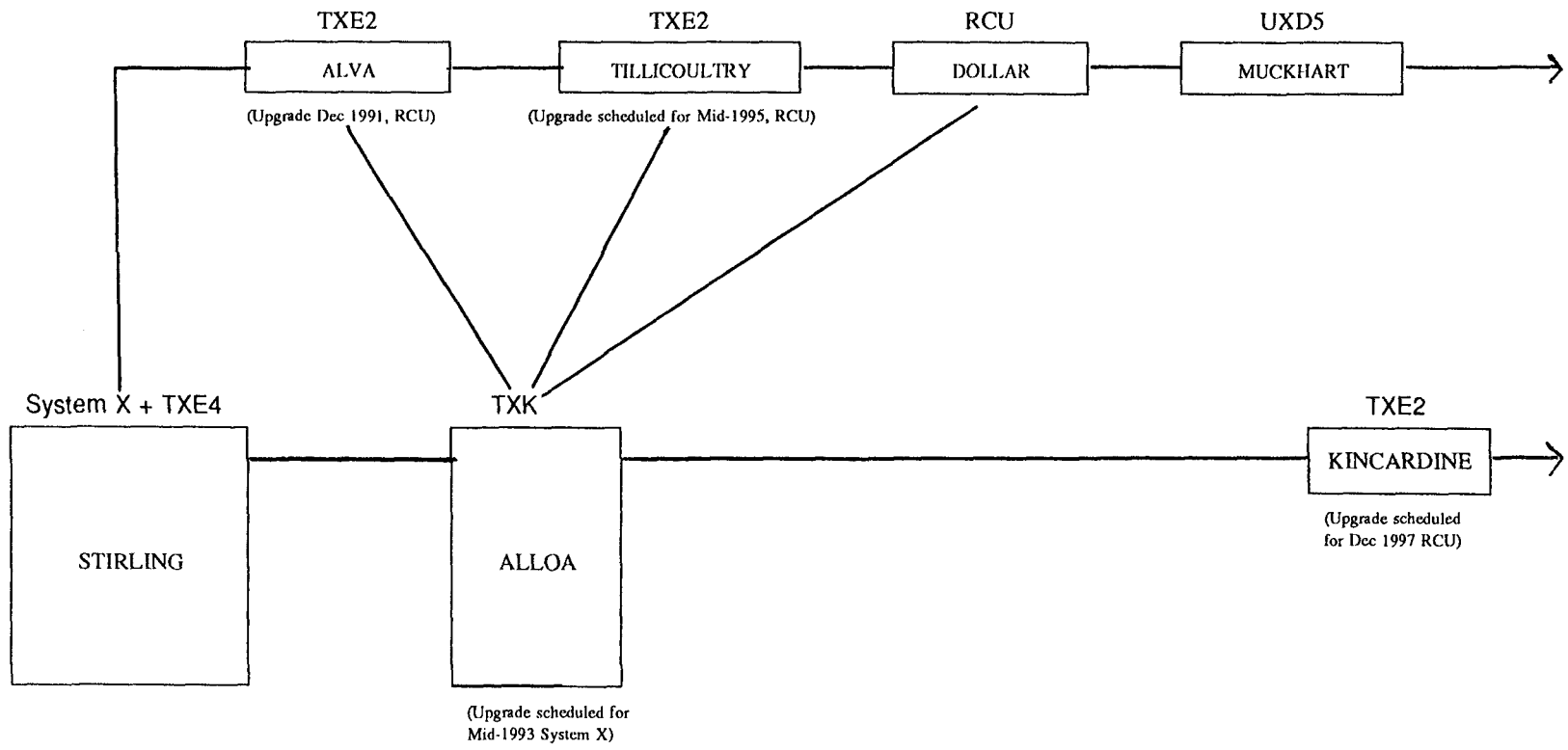
Taylor, J., Williams, H., and McLeod, B., "Telecommunications in Scotland : Auditing the Issues", **Quarterly Economic Commentary**, March 1993.

Figure 1
BT's PUBLIC NETWORK - CLACKMANNAN DISTRICT



RCU = Remote Concentrator Unit (digital); **TXK** = Crossbar Exchange (analogue); **TXE** = Semi-Electronic Exchange (analogue); **System X** = Digital Exchange; **UXD5** = Small Pseudo Digital Exchange

Figure 2(a)

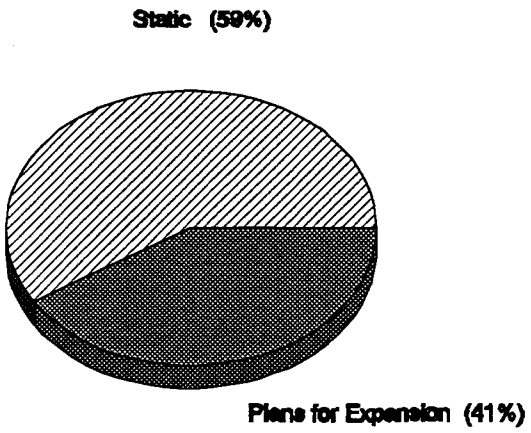


Figure 2(b)